

DRAFT CURRICULUM

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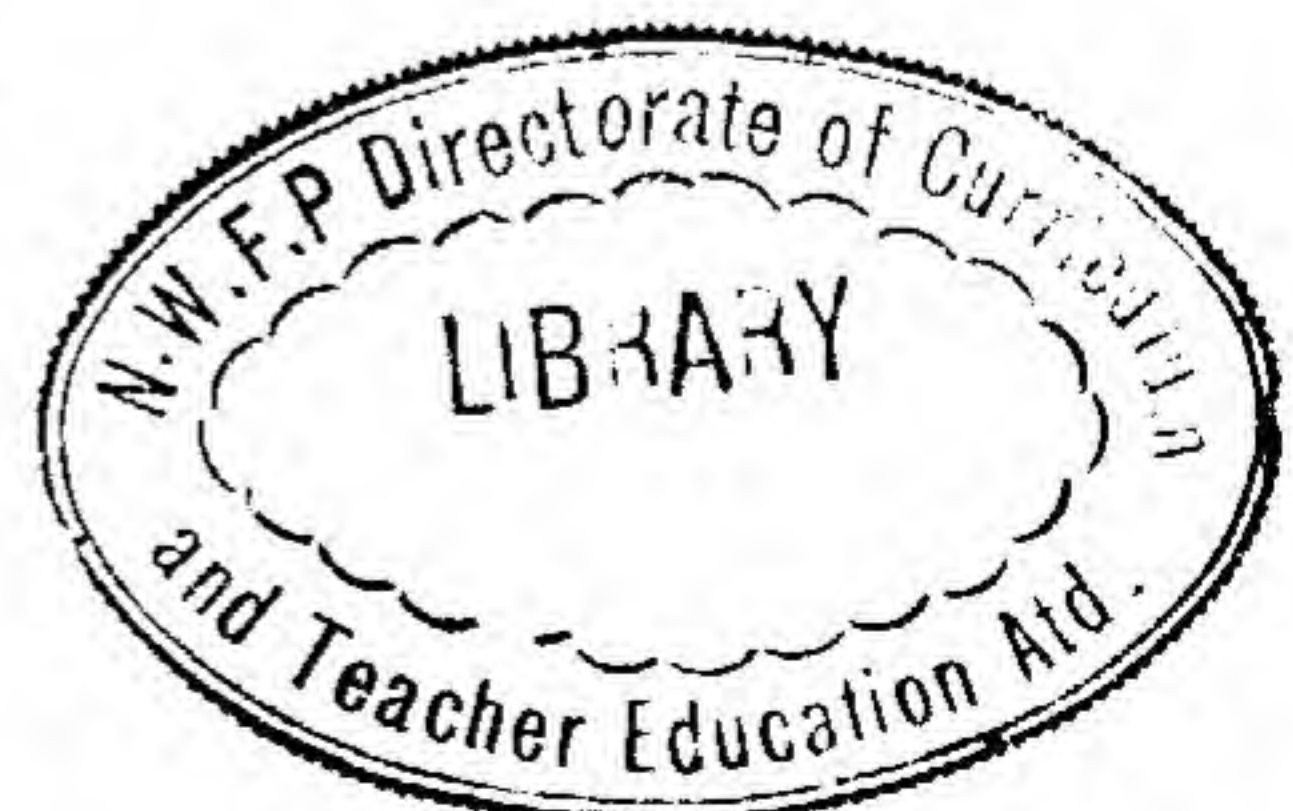
Environmental Studies

For Classes

(IX-X)

Developed by

Directorate of Curriculum & Teacher Education NWFP
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PREFACE

A nation without means of reforms is a nation without means of survival. The best course to make reforms is always remain in education. The Federal Govt of Pakistan feels the need of modifying, revising and making abreast of time the curricula across the levels and subjects (I-XII). Form now in consonance of National Education Policy (1998-2010) already pure sciences, social sciences and languages curricula in two phases i.e 2002 AD and 2001 AD respectively have been designed and developed in collaboration with all 4 Curriculum Bureaux accordingly. This is the 3rd phase - 29 subjects yet 61 level is in operation.

The NWFP Curriculum & Teacher Education Directorate under the auspices of the Secretary School & Literacy Department and certainly in collaboration with Federal Ministry of Education, Curriculum Wing, Islamabad has convened various Provincial Draft Curriculum Development Committees meetings comprising working teachers, Subject Specialists, University/College teachers and Curriculum Developers to prepare the document in selected disciplines as per availability of financial assistance.

The curriculum development has always been remain continuous process. Indeed, to accomplish this titanic task one needs immense commitment, stout vigour and profound professional insight. Special gratitude to Almighty Allah that such head & heart qualities were found among the members of the committees and others engaged in the process.

We don't claim that this work is complete in all respect. However, the Ministry can ameliorate it through the modicum efforts of NCDC. Before going to depart I must like to appreciate to both committee members and all subject specialists plus officials for fulfilling the task despite the snags and limitation.

I also acknowledge the professional contribution of IUCNP- The World Conservation Union Pakistan, Programme Support for Northern Pakistan (PSNP), for developing this specific draft curricula.

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INTRODUCTION

The curriculum for environmental studies as an optional subject for classes IX-X is a pioneering initiative by the Federal Bureau of Curriculum. The purpose of this curriculum is to address the deteriorating condition of our environment through proper education for our upcoming generations. As we are aware, in the past centuries our earth has faced tremendous pressure on its air, water, land and biological resources due to the current developmental model. These resources are being exploited at a much faster rate. The water (both fresh and marine) is polluted with domestic, industrial and agricultural waste, which is turning our most needful resource into poison. The air, without which we can't survive more than three minutes, is being polluted from industrial emissions, burning of fossil fuels, burning of solid waste in open air, production of electricity and to a minor extent from natural disaster such as volcano eruption. Our land, a source of our survival through provision of food, shelter and pleasant environment is under threat due to over grazing, over cultivation, mismanagement of irrigation practices and deforestation, which is causing erosion thus accelerating the process of desertification. Biodiversity, a hub of the wheel of life, is facing threats of habitat loss, pollution, wildlife trade, introduction of alien species and illegal poaching and hunting. This has resulted into rapid extinction of many species, even before they are discovered.

During the middle of the last century, the world started viewing these environmental issues as major threat for human survival. For this purpose several conferences were held such as the conference on Human Development and Environment in 1970, Earth Summit in 1992 and the World Summit on Sustainable Development in 2002 to collect leaders of the world for discussing this important issue. Beside, various international conventions such as the Convention on Biological Diversity, Convention to Combat Desertification and Convention for Protection of Ozone Layer were signed by many countries of the world to conserve the integrity of nature.

Environmental conservation is a relatively new subject in Pakistan. It was in the late eighties that Pakistan decided to develop a National Conservation Strategy (NCS). This strategy was developed by the technical assistance of IUCN – The World Conservation Union Pakistan. The strategy laid the foundation of integrating environmental concerns into various sectors of the society. Environmental education was highlighted as an important area to be integrated into the education sector. Therefore, governmental institutions and other organisations working in the field of environment are putting a lot of efforts towards integrating environmental concerns into the curriculum at all levels, training of teachers and teacher educators and developing institutes for specific disciplines in environmental studies such as environmental sciences and environmental engineering. Efforts are being geared towards bringing environmental education into the non-formal education sector as well.

Environmental science is a multi-disciplinary subject, which focuses on human interaction with the environment. It highlights the scientific processes involved in these interactions in order to study the quality of environment. Moreover, it also deals with the impact of environmental degradation and its solutions from various dimensions such as legal, ethical, educational and economical aspects. The present draft curriculum on environmental studies provides an opportunity to students to gain in-depth knowledge about environment and its threats in a holistic manner. It deals with issues of land, water, air and biological resources in greater details with a focus to provide opportunities for students to discuss and explore these issues with a variety of learning activities. It provides learners with a view to understand the global initiatives and local initiatives for addressing these concerns. Besides, it promotes discussion on environmental ethics and the views on environmental conservation in various religions particularly in Islam.

The draft curriculum would make an effort in sensitising students about environmental concerns and provide them with necessary skills (according to their grade level) to initiate a process of change in their attitudes towards environmental conservation.

Aims and Objectives

- Understand the concept of environment and the major ecosystems of the world.
- Establish links between environment and development and comprehend the impacts of human interaction with environment
- Develop awareness about various environmental issues at global, national and local levels.
- Develop the curiosity among students to know more about environmental issues and its impacts on our world
- Appreciate the biodiversity and other natural resources of the world and its usefulness for human beings.
- Understand the interconnectedness of the web of life and its significance for earth's vitality.
- Undertake small projects at school and community level to spread the messages of environmental conservation
- Acknowledge the teaching of world religions especially that of Islam about environmental conservation and make an effort to internalise them
- Develop environment friendly attitudes (for effective use of resources by the students at this stage)

Chapter I

Introduction to Environment

Objectives	Concepts	Contents	Activities	Evaluation
<p>Cognitive</p> <ol style="list-style-type: none"> 1. Know the environment and its various types 2. Comprehend the meaning of Biosphere and its components 3. Describe the concept of ecosystem and role of its various components 4. Explain the significance of natural resources 5. Highlight the features of major ecosystems of the world 6. Highlight the important features of ecosystem of Pakistan 7. Identify the sources of renewable and non renewable resources of energy <p>Affective</p> <ol style="list-style-type: none"> 1. Feel the importance of biosphere and the natural resources for vitality of earth 2. Become sensitive to the importance of ecosystems and life web for living organisms 3. Appreciate the diversity of ecosystems of the world including that in Pakistan. 4. Become careful in using non-renewable and renewable sources of energy. <p>Psychomotor</p> <ol style="list-style-type: none"> 1. Develop life webs for various ecosystems 2. Collect information on ecosystems of Pakistan 3. Observe the features of a particular ecosystem to comprehend the inter-relatedness in that system. 	<ul style="list-style-type: none"> • Environment • Natural resources • Ecosystem • Biosphere • Life web • Renewable and non renewable sources of energy 	<ul style="list-style-type: none"> • Definition of environment, types and components of environment • Definition of Biosphere and its components with an emphasis to importance of natural resources • Sources of energy for life - renewable and non renewable sources • Introduction to Ecosystems and its components, life web and its components • Major ecosystem of the world with a focus to the systems in Pakistan 	<ul style="list-style-type: none"> • Group discussions and presentation on types of environment • Info search on important features of various ecosystems. Making presentation for the class and schoolmates. • Play the game of <i>Web of life</i> to highlight the importance and inter-relatedness of living things with their natural environment • Observe their immediate environment and highlight the connections between living things and their surrounding. Also life web in their surrounding can be observed. Students can maintain a diary where they can keep a record of their observation and findings to share with their colleagues. • List the various sources of energy and its kind and its use (renewable and non-renewable) also the status of these resources in Pakistan. 	<ul style="list-style-type: none"> • Assess the performance (interest, confidence, group dynamics, comprehension) of students while collecting information, accessing it and presenting it to their colleagues about the various ecosystems of Pakistan. • Continuous evaluations could be done by asking questions, giving out short quizzes, asking students for short presentations to assess their learning about the inter-relatedness of living and non-living thing in an ecosystem. • Students' interest in observing the various components, processes and inter-relatedness of natural system could be assessed by maintenance of their pocket diary and through discussion and writings in the classrooms. • Monthly, bimonthly or quarterly tests can be used to assess their level of comprehension about the content of the chapter.

Chapter II

Air and its Pollution

Objectives	Concepts	Contents	Activities	Evaluation
<p><u>Cognitive</u></p> <ol style="list-style-type: none"> 1. Awareness about the interaction of human beings with their environment and vice versa 2. Describe the features and composition of atmosphere, weather and climate 3. Define the phenomenon of air pollution, Green House Effect, Ozone Layer depletion, Acid Rain and Noise pollution. 4. Identify the causative agents and the consequences of these pollution for the overall environment <p><u>Affective</u></p> <ol style="list-style-type: none"> 1. Become sensitive to the environmental damage caused by human activities 2. Feel the importance of clean and healthy air and atmosphere 3. Develop a sense of responsible behaviour to address these issues at individual and communal level <p><u>Psychomotor</u></p> <ol style="list-style-type: none"> 1. Collect , analyse and present information about the given pollution at the global level 2. Conduct short surveys to know the causes and effects of air pollution in Pakistan 3. Arrange awareness campaigns in and outside school to address pollution related issues. 	<ul style="list-style-type: none"> • Atmosphere • Climate • Weather • Green House Effect • Ozone layer depletion • Acid rain • Air pollution • Noise pollution • Human health and environmental concerns 	<ul style="list-style-type: none"> • Introduction to resources of air such as atmosphere, weather and climate. • Components and characteristics of atmosphere • Green house effect, its causes and impacts • Ozone layer depletion, its causes and impact with a focus to preventive measures • Acid Rain, its causative agents and impacts with a reference to the chemical reactions involved. Approaches to reduce its frequency • Air pollution, its causes and impacts esp. vehicular emissions. Measures to address this menace. • Noise pollution, its causes and impact ways to overcome this problem. <p>(all these information would be based on global as well as national data, where require)</p>	<ul style="list-style-type: none"> • Involve students in collecting information about air pollution and related issues at global level • Conducting short surveys about the sources of air pollution in Pakistan esp. vehicular emissions • Develop a <i>Green House</i> for plants to relate the phenomenon of global warming. (if facilities are available) • Effects of noise pollution on human health can be demonstrated by doing a small comparative study (of people working/living in very noisy and quiet areas. (it may include talking to people about their health problems, their daily routine and advantage and disadvantages of their working environment.) • Students can enrich their knowledge by talking to their family members and friends about effects of air pollution and related issues. • Use of discussion and brain storming techniques during classroom teaching 	<ul style="list-style-type: none"> • Assess the abilities of students to collect and analyse information about air pollution and related issues through assignment and its presentation • Understanding of students about the effects of air pollution/noise pollution can be assessed through the survey method and presentation of its finding. • Monthly and quarterly tests would assist in assessing the content knowledge of students

Chapter III

Water Resource and its Pollution

Objectives	Concepts	Contents	Activities	Evaluation
<p><u>Cognitive</u></p> <p>1) Identify the various sources of water and its significance</p> <p>2) Demonstrate the processes of hydrological cycle and its importance for life</p> <p>3) Understand the issue and implication of fresh water scarcity in Pakistan</p> <p>4) Identify the sources of fresh and marine water pollution and its consequences for life on this planet</p> <p><u>Affective</u></p> <p>1) Acknowledge the importance of clean water resources/ channels for healthy life</p> <p>2) Feel the need for individual and communal responsibility for water conservation</p> <p>3) Contribute in spreading awareness about water pollution</p> <p><u>Psychomotor</u></p> <p>1) Collect, analyse and present information about the water sources in Pakistan</p> <p>2) Arrange school and community level awareness programmes for water conservation</p> <p>3) Develop models (charts and model made up of low cost no cost material) to demonstrate treatment of drinking water</p>	<ul style="list-style-type: none"> Water as a resource Hydrological cycle Pollution of fresh and marine water resources Treatment of drinking water 	<ul style="list-style-type: none"> Forms of water resource in the world such as oceans, seas rivers, glaciers, wetlands and ground water with a specific focus to water resources in Pakistan Hydrological cycle Types of water use Scarcity of fresh water resources Sources of fresh water pollution and its effects Sources of marine pollution and its effects Treatment of drinking water (theory, that includes discussion on processes. It should also highlight effect of practices such as boiling for drinking water treatment) Impact of water pollution on human health 	<ul style="list-style-type: none"> Conduct water audits for their school Run campaigns for water conservation at school and community level Collect and present the information about sources and impacts of fresh and marine water pollution in Pakistan Develop models for hydrological cycle and drinking water treatment If possible, visit a near by water reserve (lake, river, pond) to study its condition, life depended on it and its issues. (Perhaps students can adopt the reservoir through a project with the near by communities, to look after its cleanliness, providing information to visitors about the reservoir) If students can't visit the site, they can collect information about its resources and issues. Demonstrate the increased use of fresh water during last few centuries by identifying the amount of water used in various life activities by three generations (grand parents, parents and by themselves) and study the difference in patterns of water use by each generation. Survey of their communities about the water borne diseases 	<ul style="list-style-type: none"> Assess knowledge of students about water pollution in Pakistan through discussion, debates, Info collection assignments, tests, and quizzes. Evaluate skills of students in collecting, arranging and analysing information about water, working in groups, presenting information, developing models, arranging campaigns and working with communities. Quizzes, tests, narrative writing of experiences from their assignments and projects can be also be used for assessment. Interest of students can be accessed with the water conservation practices in their lives.

Chapter IV

Land and Soil Resources and it Pollution

Objectives	Concepts	Contents	Activities	Evaluation
<p><u>Cognitive</u></p> <ul style="list-style-type: none"> • Know the basic information about composition of soil • Define the process of soil erosion and its effect on soil fertility • Describe deforestation and its consequences • Identify the causes and impacts of desertification in Pakistan • Define the various forms of waste and its properties • Highlight the process of solid waste management <p><u>Affective</u></p> <ul style="list-style-type: none"> • Appreciate the presence of topsoil for maintaining soil's fertility • Encourage the conservation of forests • Practise the principles of waste minimisation (4 R's: Refuse, Reduce, Reuse, Recycle) • Discuss the issues related to desertification <p><u>Psychomotor</u></p> <ul style="list-style-type: none"> • Involve in collecting, managing and analysing information about issues related to soil and land. • Demonstrate small models for solid waste management such as composting • Arrange campaigns for issues such as tree plantation and its care, reducing waste esp. plastic bags • Compare the physical properties of the local soils. 	<ul style="list-style-type: none"> • Soil composition • Soil erosion • Soil conservation • Deforestation • Desertification • Solid waste 	<ul style="list-style-type: none"> • Basics of Soil (very basic level information) • Soil erosion and conservation practices for soil • Forest of Pakistan, its location, significance • Land degradation – deforestation, desertification and solid waste disposal: <ul style="list-style-type: none"> • Deforestation, its causes and consequences. Steps for addressing deforestation. • Desertification, its causes and impact • Introduction to Solid waste, its types and its safe disposal 	<ul style="list-style-type: none"> • Collect soil samples from various areas such as field, garden, playground and compare them (colour, texture, presence of organisms) • Discuss pros and cons of organic and inorganic farming while assessing the situation in Pakistan • Collect information about the Forest of Pakistan, its location, benefits and threats. Highlight suggestion for improvement. (the same activity could be done for desertification in Pakistan) • Involve students in role-plays to define issues of deforestation and desertification from various stakeholders' point of views such as community members, foresters, environmental conservator (NGOs & government dept. such as EPA, Wildlife agriculture dept.) • Make a compost pit in school and if possible in communities. • Conduct survey for the amount and type of waste generated in school and community. Based on that, arrange awareness campaigns for promoting 4 R's for waste management • Planting trees and adopting them (each class taking care of specific trees). Grow vegetables in the school ground (if available) or in pots and encourage the use of compost as manure. (Seeking support from the local forest dept. for the establishment of schools nurseries) 	<ul style="list-style-type: none"> • Assess skills of students such as interest, working in groups, confidence, initiative taking, analysis of information, critical thinking through various activities (such as the ones suggested in the activities column). • Evaluate content knowledge and its comprehension through quizzes, tests, reflective writing on experiences and projects they are involved in.

Chapter V

Biological Resources and their Loss

Objectives	Concepts	Contents	Activities	Evaluation
<p>1. Cognise the notion of biodiversity</p> <p>2. Awareness of the richness of biodiversity across the globe with a focus to Pakistan</p> <p>3. Analyse the threats to biodiversity in Pakistan and suggest measures for addressing them</p> <p><u>Affective</u></p> <p>1. Appreciate the richness of biodiversity on earth and its importance for our survival.</p> <p>2. Understand the significance of healthy habitats for the survival of life.</p> <p>3. Promote care and concern for all living beings and their habitats.</p> <p><u>Psychomotor</u></p> <p>1) Collect and analyse the data on biodiversity of Pakistan</p> <p>2) Visit their own locality to enumerate local animals and plant and identify their types and threat</p> <p>3) Actively involve in raising awareness about importance of biodiversity conservation for our life.</p> <p>4) Construct habitats for animals and plants</p>	<ul style="list-style-type: none"> Biodiversity as a resource Habitat Threats to biodiversity and its impacts Threatened, Endangered, Extinct species of plants and animals 	<ul style="list-style-type: none"> Definition and Importance of biodiversity as a resource Biodiversity richness in the world and its benefits with a specific focus to that in Pakistan Importance of cultural diversity, a focus to the cultural diversity with in Pakistan Biodiversity Loss, its causes and impacts world wide focussing that in Pakistan 	<ul style="list-style-type: none"> Organise a walk in school or near by garden/field or street for local bird, insect, plants watch. Students can keep a pocket diary to note their characteristics Call speakers from govt. & other organisations such as Wildlife, Forest and Zoological Survey Depts., EPA IUCNP and WWF to talk on the biodiversity of Pakistan and its issues. Conduct library/ internet search to collect information about threatened endangered and extinct species of plants and animals and highlight individual & communal actions to overcome that. Construct habitat for birds, plants and other animals to sensitise student and also to study their characteristics Generate classroom discussions on significance of biodiversity- taking examples of vulnerable plants and animals and effects of their loss on a broader level Organise talk shows, debates, speeches, role-plays and exhibitions to demonstrate importance of biodiversity for school and nearby communities. 	<ul style="list-style-type: none"> Develop worksheets, small quizzes, MCQs, labelling activities for assessing the content base of the students. Provide case studies/ news paper clippings about biodiversity issues to evaluate analysis and synthesis skills of students Certain skills such as observation, inferring, relating, critical thinking, group dynamics and , advocating can be assessed by involving students into various activities (such the ones mentioned in the activities column) Interest of students and their attitudes towards animals and plants can be observed by their involvement in various activities such as awareness raising campaigns, habitat construction for plants and animals and taking care of them.

Chapter VI

Environmental Conservation – History and Initiatives

Objectives	Concepts	Contents	Activities	Evaluation
<p>1. Knowledge of the environmental movement at the global level</p> <p>2. Identify the important features of GoP's policies and legal initiatives for environmental conservation</p> <p>3. Analyse the initiatives taken for environmental conservation and its impact on the overall environment</p> <p>4. Define the concept of sustainable development</p> <p><u>Affective</u></p> <p>1. Express opinions about the environmental initiatives at global, national and local levels</p> <p>2. Organise the historical development for conservation in order to reflect on its impacts for the targeted communities.</p> <p>3. Feel the importance of carrying out local initiatives for conservation</p> <p><u>Psychomotor</u></p> <p>1. Collect information about the conservation history and initiatives</p> <p>2. Visit/Study national and local level institutions/ initiatives for conservation</p> <p>3. Document their experiences while working with communities and institutions</p>	<ul style="list-style-type: none"> • Conservation • Sustainable Development • Global environmental Initiatives • Policies and legal framework of GoP • Conservation/ Sustainable Development Strategies • Local initiatives for environmental conservation 	<ul style="list-style-type: none"> • History of Global environmental movement • GoP policies and legal initiative (NCS, NEQS, PEPA 97) • Present scenario for environmental conservation • Institutions working for environmental conservation • Community level initiatives for environmental rehabilitation such as OPP 	<ul style="list-style-type: none"> • Discuss the historical development of environmental movement with the help of pictures, videos and other teaching aids • Arrange visits / or review the case studies of the local level conservation initiatives such as OPP • Assign groups of students to discuss the global initiatives and the policies of government (NEQS, conservation/ sustainable development strategies, PEPA 97) in order to study them and discuss their value for conserving the environment. • Call experts from various govt. and other organisations working in the field of conservation to talk about the environmental movement / provide material (books, videos) for awareness raising of students. 	<ul style="list-style-type: none"> • Monthly and quarterly tests, quizzes, MCQ, objective and subjective papers can be developed for checking the content knowledge. • Assessment of content knowledge can be extended to evaluate the skills of analysis and synthesis by asking students to comment on the effects of certain initiatives and their opinion about the way forward. • Interest, enthusiasm, critical thinking, synthesis, group dynamics can be observed by involvement of students through various activities.

Chapter VII

Environmental Ethics

Objectives	Concepts	Contents	Activities	Evaluation
<p><u>Cognitive</u></p> <ul style="list-style-type: none"> Define the concept of environmental ethics Highlight environment friendly principles of major world religions. Explain the nexus between Islam and environment Describe the teachings of Islam about conservation Apply (students') their learning to take personal initiatives for conservation <p><u>Affective</u></p> <ul style="list-style-type: none"> Initiate discussions on environmental ethics Practice environment friendly practices in their (students') lives Encourage environment practices in school and communities <p><u>Psychomotor</u></p> <ul style="list-style-type: none"> Collect information about teachings of various religion on environmental conservation Carry out the study of Islamic literature to identify teaching about issues such as biodiversity, pollution, consumerism, personal and societal responsibilities Initiate a community/school level initiative for environmental conservation 	<ul style="list-style-type: none"> Environmental ethics Islamic teaching on Conservation Consumerism Individual and collective responsibilities towards environment 	<ul style="list-style-type: none"> Introduction to environmental ethics Environment principal and practices highlighted in various religions of the World Nexus between Islam and environment Teachings of Islam on biodiversity and conservation of natural resources Responsibilities of individuals and societies for conservation in the light of Quran Local and global examples of individual and societal responsibilities towards environmental conservation 	<ul style="list-style-type: none"> Initiate debates about ethical principles focussing it to environmental ethics. Identify cases from newspaper, real life experiences and other case studies to involve students in debates through the use of controversy techniques Collect and present information about environmental conservation in various religions especially Islam Organise reflection session on how well the society is taking forward the teaching of Islam for environmental conservation Initiate small projects such as water conservation, waste management, biodiversity watch at school/ home /community level. Identify conservation practices (from global and local examples) that individuals and communities can perform. Use these as awareness tools while working with families and communities. 	<ul style="list-style-type: none"> Assess students' approach in linking environmental ethics with real life situations Assess the ability to reflect, critically analyse, work in groups, advocate, take initiatives and comprehend information from various sources through involving students in various activities. Continuously evaluate students by asking questions, generating discussion and organising reflective session, for assessing their comprehension of environmental friendly principles.

Guidelines for the Textbook Writers

The course on environmental studies is designed to equip students with necessary knowledge, skills and attitudes for developing a sound society. The textbook should give an equal emphasis on these three areas in order to bring about holistic development of students. In this connection following guidelines could be useful for the textbooks developers:

Content of the Book

- The content should be well researched and up to date
- Appropriate examples of the topics (at global, national and local levels) should be provided for effective comprehension of students
- Proper references should be provided for important information and examples at that place. In addition bibliography should be provided at the end of the book
- While writing the content of each topic, necessary attention should be provided to the objectives in all the three domains(cognitive, affective and psychomotor)
- Each topic should leave some sort of curiosity in the minds of students at the end of each chapter. It could be in the form of a question such as how they see the application of air pollution (topic in the book) in their surrounding or have they observed some specific birds or reptiles in their village/ colony.
- Proper arguments and reasons (according to the level of students) should be provided for each issue.
- The language should be simple with a proper explanation of the scientific terms, where needed
- Completion of the course according to the given time lines should be considered
- The focus of the content and activities should be students and not teachers, as there is a separate guide for teachers.
- Exercises given at the end of the chapter should be thought provoking rather than just asking students to find answers from the book and copy them. It should invite them to reflect, think and analyse the given information in the textbook.

Organisation of the Content

- The topics should follow the logical sequence given in the curriculum
- The objectives of a given chapter should be mentioned in the teacher's guide. This guide could be placed at the end of the book or at the starting of each chapter. In other case this can be printed as a separate book.
- The content should be supported with necessary illustration, charts, graphs, boxes and photographs
- The content in each topic should not be too lengthy, as mentioned above some information could be presented in tabular or graphic forms.
- Supporting activities and required assignments from students should be placed in the section on *Things to do* at the end of the chapter or at the place where the appropriate content is given.
- Glossary should be provided at the end of the book or at the end of each chapter.

Layout and Design of the Book

- The book should be of A4 size with matt-finish paper (if possible) or art paper. The gramage of the paper should be between 80 – 130 gm
- The cover of the book should be of art card having 4+1 colour and laminated
- The inside pages should be of two colours or 1+ spot colour
- The font size of the body text should be 14 points
- The page should be designed such that it contains one third of matter and one forth of illustration/ photographs. The size of the illustration and photographs should not be less than 4X6 inches
- Spacing should be such that the page should not appear as packed
- Information can be presented in the form of charts, graphs with a distinct colour (may be a different shade of colour used) to make it more visible. Appropriate space should be left at all the sides of the paper.

Teachers' Training

Teacher training is an important component of any curricular development processes. Without the proper capacity building of teachers one can not expect the proper implementation of the curriculum. Therefore it is suggested that:

- At least two training programmes per year on environmental sciences and its teaching should be organised for in-service teacher training programme and a proper module on this subject should be kept in the course for pre- service teachers training programme.
- These sessions and module should emphasise on environmental orientation (which should include topics such as the rationale for talking about environmental concerns, sustainable development, global, national and local environmental issues) and education with a special focus to teaching of environmental studies. In this connection government and other organisations working in this area could be invited to conduct the training programme.
- Teachers should be oriented to modern teaching techniques, having a student centred approach and inviting students to participate in the learning process. This approach is very vital for teaching of environmental studies.
- There should be a balance between the emphasis on training about the content and its pedagogy for environmental studies. As, many times training on pedagogy takes precedence over the rationale and content of the subject matter.
- The training programmes should focus on all the three domains of the subject i.e. cognitive, affective and psychomotor. In addition, the interdisciplinary mode of environmental sciences should be highlighted.
- During these training programmes, there is a need to connect the importance of this subject to the welfare of society as well as for developing human resource to work in this field. As there is a general tendency to give importance to subjects for just passing exams.
- The training programmes should also stress on bringing environmental orientation component into the co-curricular activities such as the formation of environmental clubs.

Strategies for Teaching

The Draft curriculum on environmental studies is relatively a recent one to be introduced at the secondary level as a stand-alone subject. However, its teaching strategies are not very different from the other subjects due to its learner centred approach and experiential learning. Nevertheless, teaching of environmental studies brings a challenge for teachers to develop interest in students about our surrounding and its related issues and providing them with the required skills and attitudes to manage these issues in an effective manner. Following are some suggested teaching strategies to address these concerns:

- Teacher should use the content of the textbook as a guiding tool, however, s/he must not only restrict to the content of the book as there is growing information flow about environmental concerns through researches, documentation of environmental hazards and deterioration and also natural disasters. Therefore, it is very important for teachers to be aware of the upcoming issues, case studies and interesting examples. Keeping this in mind the teacher should plan the lesson before taking the class in the form of a lesson plan.
- The teaching should focus on child centred learning, where students should be engaged in discussions, questioning, argumentation, critical analysis and high order thinking, instead of just reading the content from the book and doing the exercises given at the end of the lesson. Besides, there should be provision of asking questions by the students during presentation of the lesson.
- Students should also be involved in active learning through simulation, role-plays, running campaigns in school and communities, conducting environmental audits in schools and communities and other such projects. This would provide them with hands on experience for internalising the learning process.
- If possible students should be taken to field visits, in addition videos on environmental concerns could be arranged for them.
- Teachers should focus on using audio-visual aids in the classrooms such as charts, and models. These aids could be made from low cost and no cost material.
- Students should be motivated to learn from their parents, communities, television, Internet, newspaper and other sources to expand their learning.
- Teachers should encourage students to participate in co-curricular activities such as formation of environmental clubs and encouraging students to participate in its activities. (Environmental club consists of a group of students (from various classes of the school) or youth in the community to encourage their involvement in small environmental projects related to their school and communities.)

Assessment and Evaluation

Assessment provides an opportunity for teachers and learners to evaluate their performances and identify strengths and areas of improvement in a holistic manner. This should be a process of learning and building up of courage and confidence in learners and not of an event to threaten and punish them. Learner's performance is also a reflection for teachers to bring about changes in their style, behaviour and approach accordingly. Therefore, just restricting exams to test memory of learners is not sufficient, as curriculum doesn't only focus on the cognitive domain, it also fosters development of psychomotor and affective domains as well.

It is suggested that following guidelines should be considered for the development of the assessment criteria:

- As mentioned earlier, assessment should not only be based on testing the memory of students, therefore the monthly tests, mid term exams and the final exams should contain equal proportion of questions pertaining to testing of memory, critical thinking, analysis, application, synthesis and evaluation of the acquired knowledge. In this way 25 percent of the questions should be kept for testing memory and the rest should be for assessing the other skills
- Exam papers should reflect all the above mentioned aspects through the change in the pattern of the questions. These questions should not only be emphasising on what, state, describe and discuss, but also include high order thinking questions such as why, how, what if, reflect, rethink, apply, reassess and analyse should be used more often.
- There is also a need to conduct daily assessment of students where by teachers can ask questions, engage students in discussion and debates, role-plays, short projects and other such activities. This evaluation should not be restricted to only cognitive domains but also for assessing learners' interest, confidence, leadership abilities, concerns for environmental issues and also to assess the gradual change in their attitudes. These would provide the basis for bringing holistic development of learners.
- For the purpose of daily assessment, it would be advisable to ask student to write reflections on their learning on a daily basis, where they can think back about their experiences (in the classroom and overall school and communities) and highlight their learning areas.
- Teachers should provide time to time feedback to students on their performance in the classroom and on other activities. They should also refer to the reflection diary of the students.

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